

REMARKS

In the January 24, 2006 Office Action, the Examiner noted that claims 1-12 were pending in the application and rejected claims 1-12 under 35 USC § 102(e) as anticipated by U.S. Patent 6,751,616 to Chan (Reference A). Claims 1-12 remain in the case. The rejections are traversed below.

The Application

The application is directed to relocation of a metadata server managing access to a storage area network (SAN), in particular when there are outstanding requests from nodes using the data migration application programming interface (DMAPI). The relocation of the metadata server is described in paragraphs [0074] to [0082] of the application. The effect of relocation on DMAPI requests is described in paragraphs [0079] to [0081] with reference to Figs. 4A, 4B, 7, 13, 15A and 15B. As described in paragraphs [0077] and [0078], at the start of read operation 404 (Fig. 15A), the behavior head 53 (Fig. 4A) is locked 406 to prevent the list of behaviors linked off behavior head 53 from changing during I/O operation by locking the vnode or virtual metadata. Since it can take a relatively long time to resolve DMAPI requests, the read operation illustrated in Fig. 15A could be held off for an unacceptably long time during relocation of the file system being accessed. To avoid generating a migrating error that is returned to the user, behavior head 53 is unlocked during execution of `dmapi_bnc` to permit vnode 42 to be converted. A loop is executed while waiting for conversion and relocation to complete making the lock available in block 420 of Fig. 15B, so that processing of the DMAPI request can proceed.

U.S. Patent 6,751,616 to Chan

The Chan patent is directed to a distributed lock manager (DLM) which quickly reconfigures the nodes in a computer system acting as a database server for a distributed database. When "a node leaves the system, the system is reconfigured to reflect the current cluster of available active nodes. ... [Conventionally] the hash function assigning resources to master nodes becomes obsolete when the number of nodes changes" (column 4, lines 20-23). In Chan, the "DLM process of changing the resource-to-master node assignments is ... referred to as 're-mapping.'" (column 4, lines 32-34). This process relates to "management of locks on shared resources ... distributed over a cluster of ... active nodes using a constant hash function to associate each resource of a plurality of shared resources with a hash value" (column 5, lines 43-47). When a cluster is reconfigured due to a change in node membership, "hash value ranges are re-mapped to master nodes by revising the hash map without changing the constant

hash function" (column 5, lines 50-51). As a result, "management locks on shared computer system resources are re-distributed" (column 5, lines 56-57).

Rejection under 35 USC § 102(e)

Prior to addressing how each claims was rejected, a brief explanation of differences between the invention and Chan will be provided. As discussed above, Chan is directed to remapping of resource-to-master node assignments when the membership of a cluster changes. The issues related to changes in cluster management are discussed in the application in paragraphs [0053] to [0073] with reference to Figs. 10-12. While, conceivably, the node removed from the system could be a metadata server, no discussion of "relocation of a required metadata server" (e.g., claim 1, line 2) has been found in Chan. Thus, Chan appears to be only concerned with avoiding changes to the constant hash function when there is no change in the metadata server(s), only a change in the number of client nodes.

All of the independent claims include the words "relocation of ... metadata server" with the ellipsis (...) representing the words "a required" on line 2 of claim 1 and line 3 of claim 10, "the" on line 5 of claim 5 and "set at least" on line 6 of claim 9. As discussed above, Chan does not teach or suggest anything that is done during relocation of a metadata server, only reconfiguration of cluster membership without any suggestion that a metadata server is being relocated. Thus, Chan is relevant only to the extent that it discloses "releasing a lock on the virtual metadata" (claim 1, line 2) which is performed in any system that uses tokens to control access to metadata. For the above reasons, it is submitted that claims 1-12 patentably distinguish over Chan.

As to the specific portions of Chan cited in rejecting the claims, column 5, lines 56-67 of Chan was cited in the rejection of claims 1, 5 and 10 as disclosing "releasing a lock on the virtual metadata if relocation of a required metadata server is underway during execution of the operations on the virtual metadata" (claim 1, lines 2-3). However, this paragraph in Chan does not describe releasing or opening locks, but rather an activity that occurs "[i]n response to a number of open locks on each active node of the cluster" (Chan, column 54, lines 58-59, emphasis added). As a result of detecting a number of open locks, "a hash value range associated with a first master node is re-mapped to a different second master node" (column 5, lines 59-60). As noted above, Chan defines "re-mapping" as "changing the resource-to-master node assignments" (column 4, lines 32-33). As described in Chan, this appears to be a re-balancing between two master nodes, both of which continue to run in the system, as opposed to "relocation of a required metadata server" as recited in the claims.

Even if the activity described in the last paragraph of column 5 of Chan is considered equivalent to relocation of a metadata server as recited in the claims, the cause and effect is exactly the opposite of what is recited in the claims. In the claims, locks on virtual metadata are released or opened "if relocation of a required metadata server is underway" (claim 1, lines 2-3). The exact opposite is described in the cited paragraph of Chan, i.e., if locks are open then an activity which for sake of argument might be considered equivalent to relocation of metadata server is initiated. Therefore, even if the activity described in column 5, lines 56-67 is considered equivalent to relocation of a metadata server, the operation recited at lines 2-3 of claim 1 is not described as being performed, because the locks are not released "if relocation of a required metadata server is underway" (claim 1, lines 2-3), but rather relocation is initiated if too many locks are open.

Claims 5 and 10 recite limitations on line 5 and lines 3 and 4, respectively, that are similar to the limitations in the body of claim 1. Therefore, it is submitted that claims 1, 5 and 10, as well as claims 2-4, 6-8, 11 and 12 which depend therefrom, patentably distinguish over Chan for at least this reason.

In the rejection of claim 9 on page 5 of the Office Action, column 5, lines 43-55 of Chan was cited as disclosing "release [of] a lock on virtual metadata when relocation of said at least one metadata server is underway" (Office Action, page 5, lines 8-9). This portion of Chan only describes maintaining a hash map "which associates a plurality of hash value ranges with each of one or more master nodes" (column 5, lines 47-49) and that "hash value ranges are remapped to master nodes by revising the hash map without changing the constant hash function" (column 5, lines 50-51) based on "the amount of lock information or a weight ... associated with each node in the cluster ... selected from a set of non-uniform master weights" (column 5, lines 52-55). Nothing has been found in the paragraph that adds to the next paragraph at lines 56-67 of column 5, which was discussed above with respect to the rejection of claims 1, 5 and 10. Since claim 9 recites "release [of] a lock on virtual metadata when relocation of said at least one metadata server is underway during execution of operations on the virtual metadata" (claim 9, last three lines), it is submitted that claim 9 patentably distinguishes over Chan for the reasons discussed above with respect to claims 1, 5 and 10.

Changes to Claim 9

The changes made to claim 9 correct a typographical error and do not relate to patentability.

Summary

It is submitted that Chan does not teach or suggest the features of the present claimed invention. Thus, it is submitted that claims 1-12 are in a condition suitable for allowance. Reconsideration of the claims and an early Notice of Allowance are earnestly solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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